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Wetlands of Suhelwa wildlife sanctuary and their potential in conservation of migratory avifauna, Uttar Pradesh, India

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ABSTRACT

Suhelwa Wildlife Sanctuary is an important stopover site for migratory birds to the Indian subcontinent since ancient times as vivified in Buddhist literature. Annapurna hot flyway is the most probable route taken by migratory birds of Suhelwa Wildlife Sanctuary. There are a total of 11 water reservoirs in and around the Suhelwa Wildlife Sanctuary. From 2013 onwards, significant efforts have been undertaken to explore the thriving avifauna of the region. A rich diversity of 75±5 water birds recorded includes Black-necked Grebe, Falcated Duck, Ferruginous Pochard, Bar-headed Goose, Northern Pintail, Red-crested Pochard, Black Stork, Painted Storks, and Lesser Adjutant. A high count of 80 Black Storks was observed on 8 January 2019 at Khairman Reservoir. Suhelwa is under tremendous human pressure mainly due to logging of wood for livelihood. The promotion of eco-tourism will help in coping up with this problem and community-based bird tourism for Suhelwa, through use of existing gram sabha buildings/infrastructure has been extensively discussed at district and state-level since 2013. Organization of bird festivals in winters and summers will enhance eco-tourism. Awareness programs and involvement of local people in wetland conservation needs to be taken up. It is hoped that with the national and international birding community acknowledging the birding wealth of Suhelwa, forest-fringe communities will be enabled to develop a unique brand of low-impact and truly sustainable bird tourism in Suhelwa.

Keywords: Suhelwa Wildlife Sanctuary, flyway, migratory, community, eco-tourism

1. INTRODUCTION

Suhelwa Wildlife Sanctuary is an important stopover site for migratory birds to the Indian subcontinent since ancient times as vivified in Buddhist literature. Annapurna hot flyway is the most probable route taken by migratory birds of Suhelwa Wildlife Sanctuary. Suhelwa has been a historically bird-rich area. According to the Gonda Gazetteer (1905) the birds of the district include all the species commonly found in the submontane

tracts (Nevill, 1905). Ecotourism is an important activity as per the Suhelwa Sanctuary Management Plan 2010-11 to 2020-21. Importance has been given to birding. Clear directives are given in all the ranges of the Sanctuary. According to the Management Effectiveness Evaluation (MEE) Report by Wildlife Institute of India, Suhelwa possesses great biodiversity value due to its contiguity with Nepal forests and potential for tiger conservation (Jhala, 2009). Suhelwa is a designated Important Bird and Biodiversity Area (IBA). But this area is considered a Data Deficient site by BNHS. While Dudhwa National Park has been extensively studied by BNHS, Wildlife Institute of India (WII) and WWF-India, practically no data existed on Suhelwa, except for a 1-year long study by BNHS (Singh, 2017).

According to the significant findings of BNHS, India has about 1200 bird species and Uttar Pradesh about 500. With nearly 300 birds species found in Suhelwa, it has approximately 60% of UP's and 25% of India's species. As per IUCN database, about 42 bird species face serious threat in the State. Of these 26 species are found in Suhelwa. This represents 61% of U.P.'s threatened species of birds (Rahmani et al., 2011; Rahmani et al., 2014).

Study Area

Suheldeo Wildlife Sanctuary, situated on the Indo-Nepal border, straddles the districts of Balrampur and Shravasti in Uttar Pradesh. Suhelwa falls in the Bhabar region. The Bhabar is a narrow belt of about 7-15 km wide, of sloping land, located on the outer margins of Shivaliks. Its terrain is porous consisting mainly of boulders and gravel and water-level is as low as 200-300ft. Terai-Bhabar constitutes a distinct ecologically important region of the country. The sanctuary measuring 120 km. in breadth and 4-6 km. wide is elongated in shape and is located on the Indo-Nepal border along an east-west axis (Bhargava et al., 2016).

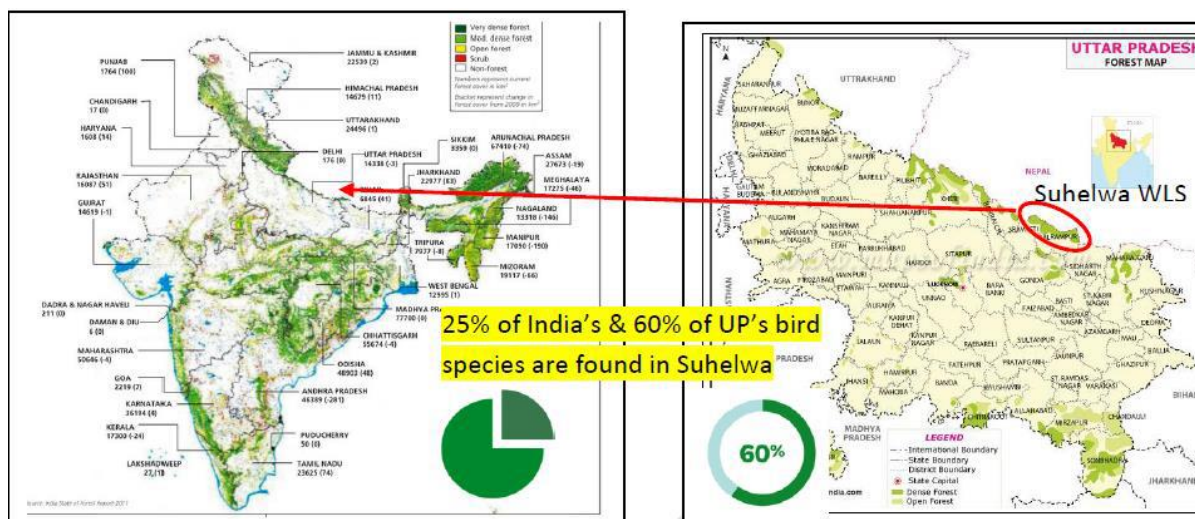


Fig.1: Study Area (Source: Singh, 2017)

The area is drained by 8-10 major seasonal rivers many of which drain into artificial reservoirs built along the southern boundary of the park. The unique geophysical attributes of the area, its plantation history, and numerous drainages and reservoirs have given rise to a mosaic of varied forest types such as pure sal, teak, broad leaf moist deciduous, semi-evergreen and small patches of grasslands fringing the reservoirs (Chanchani et al., 2014). There are total 11 water reservoirs in and around the Suhelwa Wildlife Sanctuary so as to manage monsoon floods, regulating the water level for agricultural and other functions (Rahmani et al., 2015). The wetlands are namely, Motipur, Rampur, Vanghaghwa, Khairman, Girgitahi, Ganeshpur, Baghelkhand, Bhagwanpur, Majgaowan, Chittaurgarh and Kohargaddi.

2. METHODOLOGY

Observations were undertaken since 2013 but a scientifically designed study started from 2016 i.e. over a period of four years during January, 2016 to January, 2019. Regular surveys were done by systematically walking on fixed routes along the wetlands. Birds were observed during the suitable time of the day, i.e., from 7:00 to 10:00 hr and from 15:00 to 1800 hr. Due to the winter months, sometimes observations were also undertaken during the day timings. This was done to observe maximum bird species that may be active at a different time of the day. The observational recordings were made using data sheets and 10x50 mm binoculars while photographic recordings and video recordings were done with the help of 7D and 70D DSLR Canon Cameras

and 100-400mm and 75-300 mm lenses. Birds sighted during the study period were with the help of key reference books (Ali 2002; Grimmett et al., 2007; Grewal, 2011) and categorized as residents (R) or migrants (M) according to their presence (month-wise) and data from reference books.

3. RESULT AND DISCUSSION

The study reveals that the wetlands in Suhelwa Wildlife Sanctuary have strong potential to support the rich diversity of wetland birds, including the important migratory species. The observations during the survey were compiled to get a checklist of 95 waterbirds belonging to 23 families. Of these 43 species were migratory and included Near Threatened Falcated Duck and Ferruginous Pochard (Table 1).

Table 1: Waterbirds recorded from Suhelwa Wildlife Sanctuary

S.No	Common Name	Zoological Name	Local name	Family	R/M	AC	IUCN Status
1.	Lesser whistling duck	<i>Dendrocygna javanica</i>	Seelhi, Seelkahi	Dendrocygnidae (1)	R	C	LC
2.	Bar-headed goose	<i>Anser indicus</i>	Raaj hans	Anatidae (18)	M	C	LC
3.	Grey-leg goose	<i>Anser anser</i>	Raaj hans		M	C	LC
4.	Ruddy Shelduck	<i>Tadorna ferruginea</i>	Laal surkhab		M	C	LC
5.	Common Shelduck	<i>Tadorna tadorna</i>	Shah chakwa		M	UC	LC
6.	Comb duck	<i>Sarkidiornis melanotos</i>	Nakta		R	FC	LC
7.	Cotton Pygmy Goose	<i>Nettapus coromendelianus</i>	Girja		R	FC	LC
8.	Gadwall	<i>Anas strepera</i>	Beykhur		M	C	LC
9.	Mallard	<i>Anas platyrhynchos</i>	Nilsir		M	FC	LC
10.	Indian Spot-billed duck	<i>Anas poecilorhyncha</i>	Gugral		R	C	LC
11.	Northern shoveller	<i>Anas clypeata</i>	Ghirah		M	C	LC
12.	Northern pintail	<i>Anas acuta</i>	Seenkh par		M	C	LC
13.	Garganey	<i>Querquedula querquedula</i>	Patari		M	C	LC
14.	Falcated Duck	<i>Maraca falcata</i>	Kata sinkhur		M	R*	NT
15.	Ferruginous duck	<i>Aythya nyroca</i>	Kurchiya		M	FC	NT
16.	Common teal	<i>Anas crecca</i>	Kerra		M	C	LC
17.	Red crested Pochard	<i>Netta rufina</i>	Laal sir		M	FC	LC
18.	Tufted Pochard	<i>Aythya fuligula</i>	Dubaru		M	C	LC
19.	Common Pochard	<i>Aythya ferina</i>	Burar nar		M	C	LC
20.	Common Kingfisher	<i>Alcedo atthis</i>	Chhota Kilkila	Alcedinidae (1)	R	FC	LC
21.	White breasted Kingfisher	<i>Halcyon smyrnensis</i>	Kilkila	Halcyonidae (3)	R	C	LC
22.	Stork-billed Kingfisher	<i>Halcyon capensis</i>	Bada kilkila		R	C	LC
23.	Black-capped Kingfisher	<i>Halcyon pileata</i>	Kourilla		R	FC	LC
24.	Pied Kingfisher	<i>Ceryle rudis</i>	Kilkila	Cerylidae (1)	R	C	LC
25.	Sarus Crane	<i>Grus antigone</i>	Sarus	Gruidae (1)	R	UC	NT
26.	Water cock	<i>Gallicrex cinerea</i>	Kangra	Rallidae (6)	R	UC	LC
27.	Ruddy-breasted Crake	<i>Porzana fusca</i>	***		R	UC	LC
28.	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	Dauk, Dawak		R	C	LC

29.	Purple Moorhen	<i>Porphyrio porphyrio</i>	Khima		R	C	LC
30.	Common Moorhen	<i>Gallinule chloropus</i>	Jal murgi		R	C	LC
31.	Common Coot	<i>Fulica atra</i>	Thekari		M	C	LC
32.	Common snipe	<i>Gallinago gallinago</i>	Chaha	Scolopacidae (11)	M	FC	LC
33.	Wood Sandpiper	<i>Tringa glareola</i>	Titvari		M	C	LC
34.	Green Sandpiper	<i>Tringa ochropus</i>	Hara retal chaha		M	FC	LC
35.	Common Sandpiper	<i>Actitis hypoleucos</i>	***		M	C	LC
36.	Marsh Sandpiper	<i>Tringa stagnatilis</i>	Chota gotra		M	C	LC
37.	Spotted Redshank	<i>Tringa erythropus</i>	Batan		M	C	LC
38.	Common Redshank	<i>Tringa totanus</i>	Chhota batan		M	C	LC
39.	Common Greenshank	<i>Tringa nebularia</i>	Timtima		M	C	LC
40.	Little Stint	<i>Calidris minuta</i>	Chhota panlowwa		M	C	LC
41.	Temminck's Stint	<i>Calidris temminckii</i>	Chhota panlowwa		M	C	LC
42.	Ruff	<i>Philomachus pugnax</i>	Gehwala		M	C	LC
43.	Bronzed-winged Jacana	<i>Metopidius indicus</i>	Jal pipi	Jacanidae (2)	R	C	LC
44.	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	Pihuya		R	C	LC
45.	Great Thick-knee	<i>Esacus recurvirostris</i>	Bada karwanak	Burhinidae (1)	R	UC	LC
46.	Black –winged Stilt	<i>Himantopus himantopus</i>	Tinghur	Charadriidae (7)	R	C	LC
47.	Yellow- wattled Lapwing	<i>Vanellus malabaricus</i>	Zirdi		R	UC	NA
48.	Red –wattled Lapwing	<i>Vanellus indicus</i>	Titeeri		R	C	LC
49.	River Lapwing	<i>Vanellus duvaucelii</i>	***		R	FC	NT
50.	Grey-headed Lapwing	<i>Vanellus cinereus</i>	***		M	UC	LC
51.	White-tailed Lapwing	<i>Vanellus leucurus</i>	***		M	UC	LC
52.	Northern Lapwing	<i>Vanellus vanellus</i>	***		M	UC	LC
53.	River tern	<i>Sterna aurantia</i>	Kinai	Sternidae (1)	R	FC	NT
54.	Black-headed Gull	<i>Larus ridibundus</i>	Kal-siri gangachilli	Laridae (2)	M	C	LC
55.	Brown-headed Gull	<i>Larus brunnicephalus</i>	Dhomra		M	C	LC
56.	Little Grebe	<i>Tachybaptus ruficollis</i>	Pandubi	Podicipedidae (2)	R	C	LC
57.	Great Crested Grebe	<i>Podiceps cristatus</i>	Shiva hans		M	UC	LC
58.	Great Cormorant	<i>Phalacrocorax carbo</i>	Pan-kowwa	Phalacrocoracidae (3)	R	FC	LC
59.	Little Cormorant	<i>Phalacrocorax niger</i>	Pan-kowwa		R	C	LC
60.	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	Pan-kowwa		R	C	LC
61.	Oriental Darter	<i>Anhinga melanogaster</i>	Panwa	Anhingidae (1)	R	FC	NT
62.	Little Egret	<i>Egretta garzetta</i>	Karchia bagla	Ardeidae (9)	R	C	LC
63.	Great Egret	<i>Casmerodius albus</i>	Bada bagla		R	C	LC
64.	Intermediate Egret	<i>Mesophoyx intermedia</i>	Karchia bagla		R	C	LC
65.	Cattle Egret	<i>Bubulcus ibis</i>	Surkhia bagla		R	C	LC
66.	Grey Heron	<i>Ardea cinerea</i>	Nari		M	C	LC
67.	Purple Heron	<i>Ardea purpurea</i>	Lal anjan		R	C	LC
68.	Indian Pond Heron	<i>Ardeola grayii</i>	Andha bagla		R	C	LC

69.	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	Kokraia		R	FC	LC
70.	Black bittern	<i>Dupetor flavicollis</i>	Kala bagla		R	UC	LC
71.	Black Ibis	<i>Pseudibis papillosa</i>	Kala Baza		R	FC	LC
72.	White ibis	<i>Threskiornis melanocephalus</i>	Didhar	Threskiornithidae (4)	R	UC	NT
73.	Glossy ibis	<i>Plegadis falcinellus</i>	Chhota buza		R	C	LC
74.	Spoonbill	<i>Platalea leucorodia</i>	Chamach baza		R	C	LC
75.	Painted Stork	<i>Mycteria leucocephala</i>	Janghil/Dokh		R	C	NT
76.	Asian Open bill-Stork	<i>Anastomus oscitans</i>	Ghungil		R	FC	LC
77.	White-necked Stork	<i>Ciconia episcopus</i>	Laglag	Ciconiidae (6)	R	FC	V
78.	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Loha sarang		R	FC	NT
79.	Black stork	<i>Ciconia nigra</i>	Surmal		M	UC	LC
80.	Lesser adjutant	<i>Leptoptilos javanicus</i>	Chota garud		R	UC	V
81.	Osprey	<i>Pandion haliaetus</i>	Machhlimar		M	FC	LC
82.	Eurasian Marsh Harrier	<i>Circus aeruginosus</i>	Safed Sira		M	C	LC
83.	Grey-headed fish eagle	<i>Ichthyophaga ichthyaetus</i>	Madhuya	Accipitridae (4)	R	UC	NT
84.	Greater Spotted Eagle	<i>Clanga clanga</i>	Kaljanga		M	UC	VU
85.	Small Pratincole	<i>Glareola lactea</i>	Utteran	Glareolidae (1)	R	FC	LC
86.	Plain Martin	<i>Riparia paludicola</i>	***		R	C	LC
87.	Barn Swallow	<i>Hirundo rustica</i>	***		M	C	LC
88.	Red-rumped swallow	<i>Hirundo daurica</i>	Masjid-ababil	Hirundinidae (5)	R	C	LC
89.	Wire-tailed Swallow	<i>Hirundo smithii</i>	***		R	FC	LC
90.	Streak-throated swallow	<i>Hirundo fluviicola</i>	***		R	FC	LC
91.	White Wagtail	<i>Motacilla alba (personata and dukhunensis)</i>	***		M	C	NA
92.	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	Khanjan	Passeridae (5)	R	UC	NA
93.	Citrine wagtail	<i>Motacilla citreola</i>	Pani-ka-pilkya		M	C	LC
94.	Yellow Wagtail	<i>Motacilla flava</i>	Pilkya		M	C	NA
95.	Grey Wagtail	<i>Motacilla cinerea</i>	***		M	UC	LC

AC-Abundance Code; R-Residential; M-Migratory; C-Common; UC-Uncommon; FC-Fairly Common; R*-Rare; LC-Least Concern, NT-Near Threatened; V-Vulnerable; NA-Not Available.

So far, about 330 bird species have been reported from Suhelwa Wildlife Sanctuary through various studies and field visits (Rahmani, 2015; Singh, 2017; Kushwaha et al., 2018). A high count of 80 black storks was observed on 8 January 2019 at Khairman Reservoir (Kumar et al., 2019). Black stork is a cautious species generally avoiding interaction with humans (MacKinnon et al. 2000). It is generally found alone or in pairs but at its wintering grounds, it can be observed in small groups of less than 30 individuals (Brown et al., 1982). This recent congregation of 80 black storks is an example highlighting the highlights the prospective of Suhelwa wildlife Sanctuary in sustaining the water birds. In addition to the notable records of water birds, more than 150 Amur falcons *Falco amurensis*, were recorded by the BNHS team at about 10 km before the Poorvi Suhelwa Forest Rest House on 9th November 2013. This was the first record of this species from Uttar Pradesh (Bhargava et al., 2014). The Amur falcon (*Falco*

amurensis) is a fall migration species i.e., it passes only at the onset of migration in November (Rahmani, 2016). There is high prospect that this region is an ideal habitat for both the residential and migratory species (Fig.2a & b).



Fig. 2a: Flock of Ferruginous duck, northern Pintail and Common coot



Fig.2b: Large flock of Black storks

To promote the interest of birders and researchers, 1st Annual Estimation of Resident and Migratory Birds of Suhelwa wildlife sanctuary was organized by Suhelwa Wildlife Division on January 28-29, 2017 that added 31 new species to the previous checklist (Singh, 2017).

However, there are several threats to the avifauna in Suhelwa wildlife sanctuary. The most common threats include illegal small-scale fishing that contributes to competition for food among foraging wetland birds and disturbs their foraging behaviour. A large number of people engage in fishing activity in the reservoir area (Kumar et al., 2019). At times, the birds might get entangled in the fishing nets. The village folks furthermore use the reservoir for domestic chores such as bathing, washing clothes and cattle-bathing (Kumar, 2019). Livestock grazing is common in and around the wetlands. Encroachment of forestland is still a major issue and vital corridors are still being lost (e.g. Dudhwa, Katarniaghat and Kishanpur). Livestock grazing is a major problem, especially in sanctuaries (UP-IBCN, 2015). Such an unrelenting disturbance during migration and wintering periods may also cause dramatic consequences on a birds' energy balance (Korschgen et al., 1985).

Moreover, the wetlands being located in the sanctuary are prone to disturbances caused by the local people who collect the fuelwood from the adjoining forest. They mobilize in large groups during early hours when most of the water birds are foraging

(fig.3). In 2013, Jaiswal and Bhattacharya examined the fuelwood dependency of local people on the forest resources of Suhelwa Wildlife Sanctuary, India. The analysis shows that the villagers depend heavily on forest for their fuelwood requirement. Nearly 87% households fulfill their fuelwood requirement completely from forest which is very high as compared to 50% household dependence in Orissa (Mahapatra and Mitchell, 1999). The land reform policy by the Indian government resulted in the leasing out large tracts of highly important terai habitat, for human settlements and cultivation. This resulted in the loss of terai habitat adversely affecting the terai fauna (Javed and Rahmani, 1998).



Fig.3: Local people moving to the forest to collect fuelwood

To reduce the pressure on forests and the dependence of local people on them for their livelihood, the local conservationist Ms.Niharika Singh has undertaken several measures. She motivated the communities to opt for other profession such as making furniture from Lantana and craft items to earn a living. The lack of proper marketing for these products is a barrier towards the success of this positive step.

4. CONCLUSION

Suhelwa has high potential for attracting the migratory birds' in spite of being under tremendous human pressure mainly due to logging of wood for livelihood. The promotion of eco-tourism will help in coping with this problem, and Community-based bird tourism for Suhelwa, through use of existing gram sabha buildings/infrastructure has been extensively discussed at district and state-level since 2013. Organization of bird festivals in winters and summers can enhance eco-tourism. Awareness programs and involvement of local people in wetland conservation should be promoted to protect the avifauna. It is hoped that acknowledgement of bird wealth of Suhelwa by the national and international birding community will enable the forest-fringe communities to develop a unique brand of low-impact and truly sustainable bird tourism in Suhelwa.

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Ethical approval

The Animal ethical guidelines are followed in the study for species observation & identification.

Conflicts of interest:

The authors declare no conflict of interest.

Data and materials availability

All data associated with this study are present in the paper.

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